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10/713,795	11/13/2003	Jeom-Sik Yang	P2061US	4207

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EXAMINER

VAN, LUAN V

ART UNIT PAPER NUMBER

1753

DATE MAILED: 02/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/713,795

Applicant(s)

YANG ET AL.

Examiner

Luan V. Van

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 January 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

Applicant's amendment of January 10, 2006 does not render the application allowable.

The amendment filed January 10, 2006 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: the claims 1-9 are amended to recite the limitation of manufacturing a copper foil having a rough surface with a roughness of less than 2.0 μm without surface treatment. However, there is no evidence in the applicant's disclosure to support the recitation of a roughness of less than 2.0 μm . The disclosure teaches a roughness having a range of 1.0 -3.5 μm (page 8 lines 10-18). Roughness of less than 2.0 μm is not equivalent to a range of 1.0 -3.5 μm , since a roughness value of less than one would be outside of the range. The disclosure, therefore, does not provide a clear indication to support the limitation of roughness of less than 2.0 μm without surface treatment. Applicant is required to cancel the new matter in the reply to this Office Action.

Status of Objections and Rejections

All rejections of claims 1-5 under 35 U.S.C. 102(b) and under 35 U.S.C. 103(a) from the previous office action are maintained.

All other rejections are withdrawn in view of Applicant's amendment.

New rejections under 35 U.S.C. 103(a) are necessitated by the amendments.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-9 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The claims 1-9 are amended to recite the limitation of manufacturing a copper foil having a rough surface with a roughness of less than 2.0 μm without surface treatment. However, there is no evidence in the applicant's disclosure to support the recitation of a roughness of less than 2.0 μm . The disclosure teaches a roughness having a range of 1.0 -3.5 μm (page 8 lines 10-18). Roughness of less than 2.0 μm is not equivalent to a range of 1.0 -3.5 μm , since a roughness value of less than one would be outside of the range. The disclosure, therefore, does not

provide a clear indication to support the limitation of roughness of less than 2.0 μm without surface treatment.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2, 4 and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by Dahms '159.

Regarding claims 1, 4 and 5, Dahms '159 teach an electrolyte solution containing sulfuric acid and copper sulfate (column 4 lines 49-60), based on the 1-liter electrolyte solution, comprising: 2-20 mg of bis-w-sulfopropyl-disulfide disodium salt compound (table 2); 5-20000 mg of a poly alkylene glycol-type surfactant (column 3 lines 3-17); and 20-150 mg of chlorine ion (column 4 lines 49-60). These ranges of concentration are within those of the instant claim. With respect to claim 1, using the electrolyte solution to manufacture an electrolytic copper foil is an intended use of the instant invention and, thus, is not given patentability weight. With respect to the limitation of a copper foil having a roughness of less than 2.0 μm without surface treatment as measured by an IPC TM 650 2.2.17A, the copper foil of Dahms '159 would inherently

have the same surface roughness since the solution of Dahms '159 has the same composition, as described above, as that of the instant claims. Furthermore, a solution should be distinguished over the prior art by its composition and not by the intended use or the latent properties of the solution.

Regarding claim 2, Dahms '159 teach an electrolyte solution containing a dithiocarbamic acid (column 2 lines 64-66).

Claims 1 and 3-5 are rejected under 35 U.S.C. 102(b) as being anticipated by Dahms et al. '711.

Regarding claims 1 and 4-5, Dahms et al. '711 teach an electrolyte solution containing sulfuric acid and copper sulfate (column 8 lines 5-14), based on the 1-liter electrolyte solution, comprising: 0.5-400 mg of bis-w-sulfopropyl-disulfide disodium salt compound (column 8 lines 40-45; table 2); 5-20000 mg of a poly aklylene glycol-type surfactant (column 8 lines 40-45; table 1); and 10-180 mg of chlorine ion (column 8 lines 5-14). These ranges of concentration are within those of the instant claim. With respect to claim 1, using the electrolyte solution to manufacture an electrolytic copper foil is an intended use of the instant invention and, thus, is not given patentability weight. With respect to the limitation of a copper foil having a roughness of less than 2.0 μm without surface treatment as measured by an IPC TM 650 2.2.17A, the copper foil of Dahms et al. '711 would inherently have the same surface roughness since the solution of Dahms

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et al. '711 has the same composition as that of the instant claims. Furthermore, a solution should be distinguished over the prior art by its composition and not by the intended use or the latent properties of the solution.

Regarding claim 3, Dahms et al. '711 teach an electrolyte solution containing thiourea derivatives having a concentration of 0.1-500 mg/L (column 9 lines 24-26).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dahms '159 in view of Dahms et al. '711 .

Dahms '159 teach the solution as described above in addressing claims 1. The difference between the reference to Dahms '159 and the instant claims is that the reference does not explicitly teach an electrolyte solution containing a thiourea derivative.

Dahms et al. '711 teach an electrolyte solution containing thiourea derivatives having a concentration of 0.1-500 mg/L (column 9 lines 24-26).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the solution and method of Dahms '159 by substituting the nitro compound with the thiourea derivatives of Dahms et al. '711, because using thiourea derivatives for depositing copper would yield a uniform thickness copper coating.

Claims 6, 7 and 9 rejected under 35 U.S.C. 103(a) as being unpatentable over Dahms '159 in view of Clouser et al. '887.

Regarding claims 6 and 9, Dahms '159 teach an electrolytic method comprising the steps of preparing an electrolyte solution comprising: 2-20 mg/L of bis-w-sulfopropyl-disulfide disodium salt compound (table 2); 5-20000 mg/L of a poly alkylene glycol-type surfactant (column 3 lines 3-17); and 20-150 mg/L of chlorine ion (column 4 lines 49-60); and generating the electrolytic copper foil (example 6). The copper foil is inherently deposited on a cathode, since positive metal ions are inherently attracted to

the negative electrode, and electrochemical deposition by definition requires electricity to flow between an anode and a cathode through the electrolyte solution.

Dahms '159 differs from the instant claims in that Dahms '159 does not explicitly disclosed the roughness of the copper foil (claims 6), although one having ordinary skill in the art would have expected the copper foil produced by the method of Dahms '159 would have the same roughness as that of the instant claims since the solution of Dahms '159 has the same composition, as described above, as that of the instant claims.

Clouser et al. '887 teach copper foils produced by a similar sulfuric acid and copper sulfate solution generally have a matte side raw foil roughness of about 1-10 μm (column 5 lines 26-30), which is within the range of the instant claims.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have recognized that the method of Dahms '159 would produce a copper foil having a roughness of less than 2.0 μm , because Clouser et al. '887 demonstrate that copper foils produced by a sulfuric acid and copper sulfate solution generally have a matte side raw foil roughness of about 1-10 μm . Furthermore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Dahms '159 to produce a copper foil having a roughness of less than 2.0 μm , because such copper foil would be suitable for use in flexible circuits manufacture and would have high fatigue ductility as taught by Clouser et al. '887 (column 5 lines 58-65).

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Regarding claim 7, Dahms '159 teach an electrolytic method containing a dithiocarbamic acid (column 2 lines 64-66).

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dahms '159 in view of Clouser et al. '887, and further in view of Dahms et al. '711 .

Dahms '159 and Clouser et al. '887 teach the method as described above in addressing claim 6. The difference between the references and the instant claim is that the references do not explicitly teach an electrolyte solution containing a thiourea derivative.

Dahms et al. '711 teach an electrolyte solution containing thiourea derivatives having a concentration of 0.1-500 mg/L (column 9 lines 24-26).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the solution and method of Dahms '159 and Clouser et al. '887 by substituting the nitro compound with the thiourea derivatives of Dahms et al. '711, because using thiourea derivatives for depositing copper would yield a uniform thickness copper coating.

Claims 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dahms et al. '711 in view of Dahms '159.

Dahms et al. '711 teach the solution as described above in addressing claims 1. The difference between the reference to Dahms et al. '711 and the instant claims is that

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the reference does not explicitly teach an electrolyte solution containing a dithiocarbamic acid.

Dahms '159 teach an electrolyte solution containing a dithiocarbamic acid (column 2 lines 64-66) is suitable for depositing copper to yield a shiny and tear-free copper coating.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the solution and method of Dahms et al. '711 by substituting the organic sulfur compound with a dithiocarbamic acid as taught by Dahms '159, because a skilled artisan would be able to select from among known organic sulfur compounds that are suitable for depositing copper, and because using a dithiocarbamic acid for depositing copper would yield a shiny and tear-free copper coating.

Claims 6, 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dahms et al. '711 in view of Clouser et al. '887.

Regarding claims 6 and 9, Dahms et al. '711 teach an electrolytic method comprising the steps of preparing an electrolyte solution comprising: 0.5-400 mg/L of bis-w-sulfopropyl-disulfide disodium salt compound (column 8 lines 40-45; table 2); 5-20000 mg/L of a poly alkylene glycol-type surfactant (column 8 lines 40-45; table 1); and 10-180 mg/L of chlorine ion (column 8 lines 5-14); and generating the electrolytic copper foil (example 1). The copper foil is inherently deposited on a cathode, since positive

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metal ions are inherently attracted to the negative electrode, and electrolytic deposition by definition requires electricity to flow between an anode and a cathode through the electrolyte solution.

Dahms et al. '711 differ from the instant claims in that Dahms et al. '711 do not explicitly disclosed the roughness of the copper foil (claims 6), although one having ordinary skill in the art would have expected the copper foil produced by the method of Dahms et al. '711 would have the same roughness as that of the instant claims since the solution of Dahms et al. '711 has the same composition, as described above, as that of the instant claims.

Clouser et al. '887 teach copper foils produced by a similar sulfuric acid and copper sulfate solution generally have a matte side raw foil roughness of about 1-10 μm (column 5 lines 26-30), which is within the range of the instant claims.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have recognized that the method of Dahms et al. '711 would produce a copper foil having a roughness of less than 2.0 μm , because Clouser et al. '887 demonstrate that copper foils produced by a sulfuric acid and copper sulfate solution generally have a matte side raw foil roughness of about 1-10 μm . Furthermore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the method of Dahms et al. '711 to produce a copper foil having a roughness of less than 2.0 μm , because such copper foil would be suitable for use in flexible circuits manufacture and would have high fatigue ductility as taught by Clouser et al. '887 (column 5 lines 58-65).

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Regarding claim 8, Dahms et al. '711 teach an electrolyte solution containing thiourea derivatives having a concentration of 0.1-500 mg/L (column 9 lines 24-26).

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dahms et al. '711 in view of Clouser et al. '887, and further in view of Dahms '159.

Dahms et al. '711 and Clouser et al. '887 teach the method as described above in addressing claim 6. The difference between the reference to Dahms et al. '711 and the instant claims is that the reference does not explicitly teach an electrolyte solution containing a dithiocarbamic acid.

Dahms '159 teach an electrolyte solution containing a dithiocarbamic acid (column 2 lines 64-66) is suitable for depositing copper to yield a shiny and tear-free copper coating.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the solution and method of Dahms et al. '711 and Clouser et al. '887 by substituting the organic sulfur compound with a dithiocarbamic acid as taught by Dahms '159, because a skilled artisan would be able to select from among known organic sulfur compounds that are suitable for depositing copper, and because using a dithiocarbamic acid for depositing copper would yield a shiny and tear-free copper coating.

Response to Arguments

Applicant's arguments filed January 10, 2006 have been fully considered but they are not persuasive.

In the arguments presented on page 4 of the amendment, the applicant suggests that the prior art do not disclose a copper foil having a roughness of less than 2.0 μm without surface treatment as measured by an IPC TM 650 2.2.17A. The examiner agrees that the prior art does not disclose the roughness of the instant claims. However, as stated in the office action above, the copper foil of Dahms '159 and Dahms et al. '711 would inherently have the same surface roughness as that of the instant claims, since the solution of Dahms '159 and Dahms et al. '711 has the same composition and concentration, as described above, as that of the instant claims. With respect to claims 1-5 directed to a solution, a solution should be distinguished over the prior art by its composition and not by the intended use or the latent properties of the solution. With respect to claims 6-9 directed to a method of forming a copper foil, the copper foil formed by the method of Dahms '159 and Dahms et al. '711 would inherently have the same surface roughness as that of the instant claims, since the solution of Dahms '159 and Dahms et al. '711 has the same composition and concentration, as described above, as that of the instant claims. Furthermore, the mere recognition of latent properties or additional advantages present in the prior art does not render nonobvious an otherwise known invention; and the discovery of an unknown but inherent function of the prior art cannot be used as the basis for patentability when the

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differences between the prior art and the instant invention would otherwise be obvious. (MPEP 2145).

With respect to the argument on page 4 that the prior art references are directed to a copper foil for a printed circuit board, though this may be true, there is no reason to believe that the copper foil of the prior art references cannot be used for other applications. In fact, Dahms '159 states that "others can, by applying current knowledge, readily adapt [the invention] for various applications without omitting features that, from the standpoint of the prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention" (column 6 lines 59-65). Furthermore, as the Applicant is aware, "there is no requirement that the prior art provide the same reason as the applicant to make the claim invention" (MPEP 2144).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the

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shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luan V. Van whose telephone number is 571-272-8521. The examiner can normally be reached on M-F 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

LVV
2/1/2006


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